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Anatomy of *Tmesipteris*.—Miss SYKES¹⁵ has investigated this interesting genus from material sent by Mr. A. P. W. THOMAS of New Zealand, comprising the two species *T. tannensis* and *T. lanceolata*. The genus consists of epiphytic species on tree ferns in New Zealand, Australia, and Polynesia. Only adult plants have ever been obtained, and the gametophyte is entirely unknown. Naturally the investigation by Miss SYKES has to do chiefly with the anatomy, and an outline of her results is as follows, in part confirmatory of previous work.

In the rhizome there occurs a protostele, which has usually two exarch protoxylem groups, but in passing to the aerial branch, pith arises in the center of the stele and quickly expands to form a large tissue. This is a case of a protostele passing directly into an ectophloic siphonostele, without the intermediate stage of an amphiphloic siphonostele; and all this occurs at a level at which no leaves have yet arisen. It was discovered that the course of the vascular bundles as described by BERTRAND for a sterile branch is exactly similar to that found in a fertile branch; that is, the single bundle entering the axis branches into three, the two lateral traces supplying the leaves, and the central one representing the vascular supply of the apex. In the fertile branches the central bundle supplies the synangium, and indicates to the author that the so-called "sporophyte" is caulin in nature, consisting of an axis bearing two leaves, and at its apex a synangium formed of two masses of sporogenous tissue that have fused over the tip. Attention is called also to the essential similarity in the formation of leaf and branch traces, it being claimed that the presence of a gap depends simply on the greater length of time elapsing between the division of a xylem group to form a trace and the departure of that trace from the stele. In fact, if the so-called "sporophyll" is really a sporophyll, the exit of its trace results in a leaf-gap; but according to Miss SYKES this is a branch-gap. The conclusion as to relationship, apparently inevitable in all such pieces of work, is that the Psilotaceae had better be retained as a separate division of Pteridophytes, the Psilotales.—J. M. C.

Rôle of certain elements.—The precise physiological rôle which the essential chemical elements play in plant life has long been an attractive subject for investigation. With advancing chemical knowledge the methods of experimentation have been greatly improved. It must be said that the older experiments have little value, and it is doubtful whether even the newest have very much, because the chemistry of the proteids is still such an enigma. REED has undertaken the study of the effects of four elements, potassium, phosphorus, calcium, and magnesium, upon certain filamentous algae, protonemata of mosses, prothallia of ferns, root tips of seed plants, and filaments of Basidiobolus.¹⁶ His technique contains certain improvements; at the same time, on the score of the solutions used, it is

¹⁵ SYKES, M. G., The anatomy and morphology of *Tmesipteris*. Annals of Botany 22:63-89. pls. 7, 8. figs. 13. 1908.

¹⁶ REED, H. S., The value of certain nutritive elements to the plant cell. Annals of Botany 21:501-543. figs. 2. 1907.